CHARNOCK INITIAL REGIONAL RESPONSE ACTIVITIES (CIRRA)
Charnock Sub-Basin; Los Angeles, California

Task 12.3
Regional Field Investigation Report

Submitted to:

California Regional Water Quality Control Board,
Los Angeles Region

U.S. Environmental Protection Agency,
Region IX

On behalf of:

Shell Oil Company
Shell Oil Products Company
Equilon Enterprises LLC

Prepared by:

ENVIRON Corporation
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1.0 INTRODUCTION

On behalf of Shell Oil Company, Shell Oil Products Company, and Equilon Enterprises, LLC (Shell), this preliminary regional field investigation report is submitted in partial fulfillment of Task 12.3 of the *Scope of Work (SOW) for Initial Regional Response Activities to Address MTBE and Other Gasoline Constituent Contamination in the Charnock Sub-Basin*. The location of the Charnock Sub-Basin is shown on Figures 1 and 2. Subsurface investigation activities associated with the Charnock Initial Regional Response Activities (CIRRA) regional investigation were initiated on September 18, 2000 and were completed in August 2001. The results of this investigation will be used to evaluate the subsurface stratigraphy in the Charnock Sub-Basin and the distribution of methyl-tert-butyl-ether (MTBE), other fuel oxygenates, and other gasoline constituents in the aquifers identified within the Sub-Basin.

Seven areas (Areas 1 through 7) were identified for this regional investigation (see Figure 3a). During the investigation, soil borings were advanced, coring, geophysical logging, and depth-specific groundwater sampling were conducted, and groundwater monitoring wells were completed at designated locations within the seven established areas beginning with monitoring well RMW-19. Monitoring wells RMW-1 through RMW-18 were completed during a previous assessment conducted by Geomatrix Consultants, Inc. The CIRRA regional investigation work was conducted in accordance with the Task 12.1 Regional Investigation Letter Work Plan dated August 2, 2000 and the Task 1.1 Work Plan and Project Schedule dated August 17, 2000 as amended on September 22, 2000 and October 27, 2000. The Task 1.1 Work Plan includes a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP). In a letter dated September 7, 2000, the U.S. Environmental Protection Agency (USEPA) and the California Regional Water Quality Control Board (RWQCB) provided early approval to begin field work at four regional assessment locations (1-1, 1-1a, 1-2, and 1-3) subject to conditions outlined in the letter. The work plans were approved by the Agencies on October 11, 2000 subject to additional conditions. The work plan amendments incorporated the agencies' comments.

The objectives of the regional investigation are as follows:

- Further characterize the distribution of MTBE and other gasoline constituents in the Shallow Aquifer (also known as the Shallow Unnamed aquifer);
- Obtain additional information on the thickness and extent of the Shallow Aquitard at the base of the Shallow Aquifer (also termed the San Pedro Aquitard);
- Further characterize the distribution of MTBE and other gasoline constituents in the Upper Silverado Aquifer;
- Obtain groundwater samples from perched groundwater zones in Area 1, if encountered;

- Provide additional information regarding the hydrostratigraphy in the Charnock Sub-Basin; and

- Obtain additional data regarding groundwater elevations and MTBE and other gasoline constituents in the wells over time.

Data obtained during drilling, field sampling, and well installation at each regional investigation location where work has been completed were presented in a series of Interim Data Reports. As the interim data became available during the course of the CIRRA investigation, it became apparent that additional investigation would be needed to further characterize current groundwater flow directions and the distribution of MTBE and other gasoline constituents in the investigation area, particularly in the area southeast of the Charnock well fields and east of the I-405 freeway. Shell proposed additions to the original SOW including four new investigation locations (eight additional monitoring wells), installation of piezometer clusters at three locations where only borings had been planned (six new piezometers), and the addition of a Shallow Aquifer monitoring well at one location (1-1a) where only one Silverado Aquifer well had been planned. These additions to the SOW were approved by the Agencies. The additional investigation locations are shown along with the original SOW locations on Figures 3a and 3b.

Concurrent with this investigation, the Agencies approved Shell's proposal to sample well clusters at seven regional locations on a monthly basis from February to June 2001 to supplement CIRRA Task 7 quarterly monitoring data. In addition, investigations are in progress at other sites within the Sub-Basin that will provide data that will be useful in defining hydrogeologic conditions in the Sub-Basin.

A preliminary regional field investigation report was submitted to the Agencies on July 23, 2001. The preliminary report presented the results of work completed through June 2001. At that time, work was still in progress at locations 1-1, 3-3, and 3-4. The Agencies provided comments on the preliminary report in a letter dated October 4, 2001. This final Task 12 regional field investigation report incorporates the Agencies' comments as modified in a conference call held on October 12, 2001, presents the results of the CIRRA work that was in progress at the time of the preliminary report, and to the extent feasible includes pertinent data available from other site investigations that are being conducted concurrently.

This report is based on the Task 12 interim data reports that have been submitted to date supplemented by other CIRRA deliverables, including the CIRRA database submitted in September 2001 and updated in October 2001. The CIRRA database includes data from both regional wells and other PRP sites in the Charnock Sub-Basin (the PRP site locations are shown on Figure 2). In general, the database contains data through Second Quarter 2001. The hydrogeologic setting of the Charnock Sub-Basin is described in Section 2.0, the regional investigation scope of work is outlined in Section 3.0, and the investigation results are presented in Section 4.0.

As noted above, this report is based on CIRRA investigation data through August 2001 and data available in the CIRRA database through June 2001. The interpretations contained within this report may be modified as additional information from investigations in progress becomes available.